

**WHAT IS CLAIMED IS:**

1. A computer-implemented method for construction of a model using a computer aided design system, the method comprising:  
constructing a feature of a three dimensional model based on data input by a user; and  
automatically identifying a part configured to compatibly couple with the feature, the part being identified based on design attributes of the feature.  
5
2. The method of claim 1 further comprising automatically positioning the identified part in a coupling relationship with the feature.
3. The method of claim 1 wherein identifying the part comprises selecting a part model from a part model library.  
10
4. The method of claim 3 wherein the part model comprises a first component comprising an adjustable geometry and identifying the part comprises adjusting the geometry of the first component based on an attribute of the feature.  
15
5. The method of claim 4 further comprising:  
storing a new part in the part model library, the new part comprising the identified compatible part and the adjusted geometry.

6. The method of claim 4 wherein:  
the feature comprises a hole comprising a depth attribute;  
the selected part model comprises a model of a fastener;  
the adjustable geometry of the first component comprises a length of an axis of the fastener;

5 and

adjusting the geometry comprises computing a length of the axis based on the depth  
attribute of the hole.

7. A computer-implemented method for processing a model generated by a computer aided  
design system, the method comprising:

10 constructing a feature of a three-dimensional design model based on data received from a

user; and

automatically selecting a part configured to couple with the constructed feature, the part  
being selected from a parts library, the parts library comprising data representing a  
plurality of parts and geometric characteristics of each of the parts.

15 8. The method of claim 7 further comprising automatically positioning the selected part in a  
coupling relationship with the constructed feature.

9. The method of claim 7 wherein constructing the feature comprises specifying a geometric  
characteristic of the feature, the geometric characteristic constraining a positioning of the  
part with respect to the feature.

20 10. The method of claim 9 wherein selecting comprises selecting based on conformance  
between the geometric characteristics of the constructed feature and geometric  
characteristics of parts in the parts library.

11. The method of claim 7 wherein the model data details construction of the design model based on a hierarchical relationship among components, the components being selected from the group consisting of a part, an assembly, and a subassembly.

12. A method of constructing a model using a computer aided design system, the method  
5 comprising:

selecting a feature of a model;

generating a component configured to couple with the feature by:

querying a component model repository to retrieve a component model based on compatibility between an attribute of the component model and a design  
10 attribute of the feature;

constructing a first component from the component model; and

establishing a coupling relationship between the first component and the feature.  
15

13. The method of claim 12 wherein constructing the first component comprises:

associating configuration data with an instance of the model, the configuration data representing a value of a modifiable attribute of the model.  
15

14. The method of claim 13 wherein:

the value is calculated based on an attribute of the feature.

15. The method of claim 12, wherein the coupling arrangement comprises a parametric relationship between the first component and the feature.

16. The method of claim 12 further comprising:  
receiving data from a user to modify the feature;  
automatically generating a modified component; and  
establishing a coupling relationship between the modified component and the modified  
feature.

5

17. The method of claim 16 wherein generating a modified component comprises:  
searching the repository for a second component based on an attribute of the modified  
feature;  
retrieving a second component model from the repository;  
constructing a second component from the second component model; and  
replacing the first component with the second component.

10

18. The method of claim 12 wherein querying the component model repository comprises  
formulating a database query using a description of the feature.

15

19. The method of claim 12 wherein the component model repository is extended by adding  
an additional component model.

20

20. The method of claim 19 wherein the component model can be removed from the  
component model repository.

21. The method of claim 12 wherein the component model comprises a configuration and a  
reference to a model representing a group of components.

20

22. The method of claim 21, wherein the configuration includes data that further specifies the  
model representing a group of components.

23. A computer-readable data storage medium comprising instructions for causing a computer to:  
construct a feature of a three dimensional model based on data input by a user; and automatically identify a part configured to compatibly couple with the feature, the part  
5 being identified based on design attributes of the feature.

24. The data storage medium of claim 23 wherein,  
the feature comprises a hole comprising a depth attribute; and  
the instructions to automatically identify a part comprise instructions to:  
select a fastener part model comprising an adjustable length;  
10 form a fastener part by associating length configuration data to the fastener part model, the length configuration data establishing the length of the fastener part based on the depth attribute of the hole;  
automatically position the fastener part in a coupling relationship with the hole; and store the fastener part in the part model library.

15 25. A computer aided design system comprising:  
a processing unit coupled to a database and a program storage medium, the database comprising a library of model parts and geometric characteristics of each part, and the program storage medium comprising instructions to configure the processor to:  
construct a feature of a three dimensional design model based on input from a user;  
20 and query the database to automatically construct a part from a model in the library of model parts, the constructed part being configured to couple with the feature.

26. The system of claim 25 further wherein the program storage medium further comprises instructions to automatically position the constructed part in a coupling relationship with the feature.  
25

27. The system of claim 25 wherein the processing unit comprises a computer cluster and the database comprises a remote distributed database.

28. The system of claim 25 wherein the instructions to construct the feature comprises instructions to receive from a user data specifying a geometric characteristic of the feature, the geometric characteristic constraining a positioning of the part with respect to the feature.

29. The method of claim 25 wherein the three dimensional design model is represented by a hierarchical data structure detailing construction of the design model based on a hierarchical relationship among components, the components being selected from the group consisting of a part, an assembly, and a subassembly.

10  
T08020-E507E8C60